

Ship Demonstration Project Update

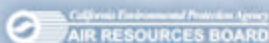
Retrofit and Testing of Emission Control
Strategies for Large Marine Diesel Engines

CARB Maritime Air Quality
Technical Working Group
November 10, 2004



Project Goals

- Demonstration of cost-effective shipboard retrofit technologies
- Reduce emissions from Ocean-Going vessels
- Generate interest potential voluntary, incentive-based, ship retrofit programs



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Project Sponsors

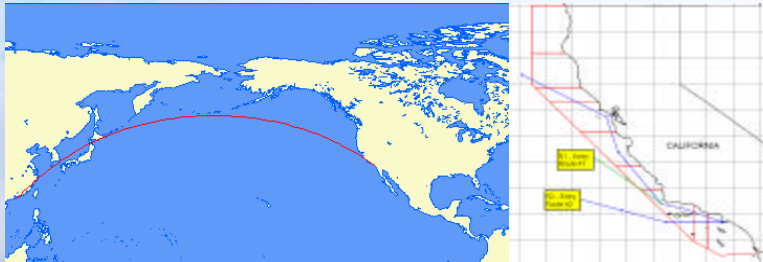
- Ports of Los Angeles & Long Beach
- U.S. Maritime Administration
- U.S. EPA
- Local Air Pollution Control Districts
 - Bay Area AQMD, Ventura APCD, Santa Barbara APCD, SLO APCD
- CARB

Proposed Technologies

- **Fuel- Water Emulsion Technology**
 - MAN B&W system
 - NOx reductions ~25% (w/ 25% water content)
 - Use on main engine & possibly aux. engines
 - To be used in CA waters only
- **Slide Valves**
 - MAN B&W technology
 - PM reductions of 25%+
 - Use on main engine
- **Fuel Comparison for aux. engines**
 - Bunker, Distillate & Emulsified fuel emission comparisons

Potential Vessel

- About 10 visits to CA per year (Pacific Rim Service)
- Diesel 2-stroke, main engine (48,840 kw)
- Annual CA emissions ~ 300 TPY NO_x, 23 TPY PM
- Calls on the west coast ports of LA and Oakland



Proposed Testing

- Main Engine Emission Tests
 - Baseline test on bunker fuel
 - Operating on water-fuel emulsion
 - Slide valves & bunker fuel
 - Slide valves & water-fuel emulsion
- Auxiliary Engine Emission Tests
 - Baseline test on bunker fuel
 - Operating on water-fuel emulsion
 - Operating on distillate fuel

Status

- Refining emission calculations and cost-effectiveness (CE) estimates – In CA waters
 - Initial NO_x CE < \$2,000/ ton
 - Initial PM CE < \$10,000/ ton
- Total Project Cost: \$550k-\$700k
- Estimated 1 year from signed agreements to testing
- Currently working w/ APL to:
 - Identify candidate vessel
 - Drafting scope of work, and agreements
 - Develop a project timeline

Next Steps

- Finalize:
 - Scope of work
 - Cost-effectiveness
 - Implementation and testing schedules
 - Agreements between sponsors
 - Agreement w/ APL
- Procurement & installation of equipment
- Emission testing